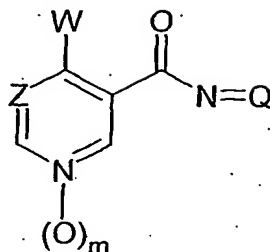


CLAIMS

1. A compound of the formula (I):



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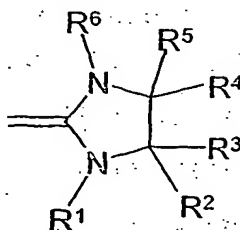
(I)

wherein:

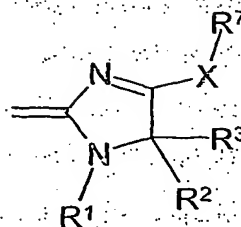
W is (C₁-C₄)haloalkyl;

Z is CH or N;

=Q is a group of formula (A) or (B):



(A)



(B)

10

R¹ and R⁶ are each independently H, (C₁-C₈)alkyl, (C₃-C₆)alkenyl, (C₃-C₆)alkynyl, (C₁-C₆)alkoxy, (C₃-C₆)alkenyloxy, (C₃-C₆)alkynyloxy, (C₁-C₆)alkylamino, di-(C₁-C₆)alkylamino, NHCO(C₁-C₆)alkyl, NHSO₂(C₁-C₆)alkyl, CO(C₁-C₆)alkyl or SO₂(C₁-C₆)alkyl which last twelve mentioned groups are unsubstituted or substituted by one or more R⁸ groups; or are (C₃-C₈)cycloalkyl or (C₃-C₈)cycloalkyl-(C₁-C₆)alkyl- which cycloalkyl radicals are unsubstituted or substituted by one or more (C₁-C₆)alkyl, (C₁-C₆)haloalkyl or R⁸ groups; or are -(CR⁹R¹⁰)_pR¹¹, -(CR⁹R¹⁰)_pheterocyclyl, OH, SO₂R¹¹, NH₂, NHCOR¹¹, NH(C₃-C₈)cycloalkyl, NH(CR⁹R¹⁰)_sR¹¹, O(CR⁹R¹⁰)_tR¹¹, -(CR⁹R¹⁰)CO₂CH₂R¹¹, O(CH₂)_rheterocyclyl, N=C[(C₁-C₆)alkyl]₂, COR^{11a} or CO-heterocyclyl; or are (C₃-C₆)alkenyl substituted by R^{11a};

R², R³, R⁴ and R⁵ are each independently H, (C₁-C₈)alkyl, (C₂-C₆)alkenyl or (C₂-C₆)alkynyl, which last three mentioned groups are unsubstituted or substituted by one or more R⁸ groups; or are (C₃-C₈)cycloalkyl or (C₃-C₈)cycloalkyl-(C₁-C₆)alkyl-

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which cycloalkyl radicals are unsubstituted or substituted by one or more (C₁-C₆)alkyl, (C₁-C₆)haloalkyl or R⁸ groups; or are (C₁-C₆)alkyl-SH, -(CR⁹R¹⁰)_pR¹¹, -(CR⁹R¹⁰)_pheterocyclyl or O(CH₂)_rR¹¹;

or R² and R³, or R⁴ and R⁵ together with the respective attached carbon atom form a carbonyl or thiocarbonyl group or a (C₃-C₈)cycloalkyl ring; or an imino group which is unsubstituted or substituted by (C₁-C₆)alkyl, CO(C₁-C₆)alkyl or R^{11a};

R⁷ is (C₃-C₆)alkenyl, (C₃-C₆)alkynyl, -(CR⁹R¹⁰)_pR¹¹, -(CR⁹R¹⁰)_pheterocyclyl, CO(C₁-C₆)alkyl or a (C₃-C₈)cycloalkyl ring; or (C₁-C₈)alkyl unsubstituted or substituted by one or more radicals selected from halogen and -OC(=O)-(C₁-C₄)alkyl;

R⁸ is halogen, (C₁-C₆)alkoxy, (C₁-C₆)haloalkoxy, S(O)_nR¹², CN, CO₂(C₁-C₆)alkyl, CO₂H, NO₂, OH, amino, (C₁-C₆)alkylamino, di-(C₁-C₆)alkylamino, carbamoyl, (C₁-C₆)-alkylcarbamoyl, di-(C₁-C₆)-alkylcarbamoyl, CH[O(C₁-C₆)alkyl]₂, (C₃-C₆)alkenyloxy, (C₃-C₆)alkynyloxy or O(CH₂)_rR¹¹;

R⁹ and R¹⁰ are each independently H, (C₁-C₆)alkyl or (C₁-C₆)haloalkyl;

R¹¹ is aryl unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₆)alkyl, (C₁-C₆)haloalkyl, (C₂-C₆)alkenyl, (C₂-C₆)alkynyl, (C₃-C₈)cycloalkyl, -(CH₂)_uR^{11a}, heterocyclyl, halogen, (C₁-C₆)alkoxy, (C₁-C₆)haloalkoxy, S(O)_nR¹², CN, CO₂(C₁-C₆)alkyl, NO₂, amino, (C₁-C₆)alkylamino, di-(C₁-C₆)alkylamino and CO(C₁-C₆)alkyl;

R^{11a} is aryl unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₆)alkyl, (C₁-C₆)haloalkyl, halogen, (C₁-C₆)alkoxy, (C₁-C₆)haloalkoxy, S(O)_nR¹², CN, CO₂(C₁-C₆)alkyl, CO₂H, NO₂, OH, amino, (C₁-C₆)alkylamino and di-(C₁-C₆)alkylamino;

R¹² is (C₁-C₆)alkyl or (C₁-C₆)haloalkyl;

X is O, S, NR¹³ or NOR¹³;

R¹³ is H, (C₁-C₈)alkyl, (C₃-C₆)alkenyl, (C₃-C₆)alkynyl or (C₃-C₈)cycloalkyl which last four mentioned groups are unsubstituted or substituted by one or more R⁸ groups; or is (C₃-C₈)cycloalkyl-(C₁-C₆)alkyl- which cycloalkyl is unsubstituted or substituted by one or more (C₁-C₆)alkyl, (C₁-C₆)haloalkyl or R⁸ groups; or is -(CR⁹R¹⁰)_pR¹¹ or

-(CR⁹R¹⁰)_pheterocyclyl;

m, s and u are each independently 0 or 1;

n is 0, 1 or 2;

p is 0, 1, 2 or 3;

r is 0 or an integer from 1 to 6; and each heterocyclyl in the above mentioned radicals is independently a heterocyclic radical having 3 to 7 ring atoms and 1 to 4 hetero atoms selected from N, O and S, and is unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₆)alkyl, (C₁-C₆)haloalkyl, (C₂-C₆)alkenyl, (C₂-C₆)alkynyl, -(CH₂)_uR^{11a}, halogen, (C₁-C₆)alkoxy, (C₁-C₆)haloalkoxy, S(O)_nR¹², CN, CO₂(C₁-C₆)alkyl, NO₂, OH, amino, (C₁-C₆)alkylamino and di-(C₁-C₆)alkylamino; or a pesticidally acceptable salt thereof.

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2. A compound or a salt thereof as claimed in claim 1, wherein W is CF₃.

3. A compound or a salt thereof as claimed in claim 1 or 2, wherein Z is CH.

15 4. A compound or a salt thereof as claimed in claim 1, 2 or 3, wherein R¹ and R⁶ are each independently H, (C₁-C₈)alkyl, (C₃-C₆)alkenyl, CO(C₁-C₆)alkyl or SO₂(C₁-C₆)alkyl; or are -(CR⁹R¹⁰)_pR¹¹.

5. A compound or a salt thereof as claimed in any one of claims 1 to 4, wherein
20 R², R³, R⁴ and R⁵ are each independently H, (C₁-C₈)alkyl, (C₃-C₆)alkenyl, (C₃-C₆)alkynyl, -(CR⁹R¹⁰)_pR¹¹, -(CR⁹R¹⁰)_pheterocyclyl or O(CH₂)_rR¹¹; or R² and R³ together with the attached carbon atom form a carbonyl or thiocarbonyl group, or an imino group which is unsubstituted or substituted by (C₁-C₆)alkyl, CO(C₁-C₆)alkyl or R^{11a}; or R² and R³, or R⁴ and R⁵ together with the respective attached carbon atom
25 form a (C₃-C₈)cycloalkyl ring.

6. A compound or a salt thereof as claimed in any one of claims 1 to 5 wherein:
W is CF₃;

Z is CH;

30 R¹ and R⁶ are each independently H, (C₁-C₈)alkyl, (C₃-C₆)alkenyl, CO(C₁-C₆)alkyl or SO₂(C₁-C₆)alkyl; or are -(CR⁹R¹⁰)_pR¹¹.

- R^2 , R^3 , R^4 and R^5 are each independently H, (C₁-C₈)alkyl, (C₃-C₆)alkenyl, (C₃-C₆)alkynyl, $-(CR^9R^{10})_pR^{11}$, $-(CR^9R^{10})_p$ heterocyclyl or $O(CH_2)_rR^{11}$; or R^2 and R^3 together with the attached carbon atom form a carbonyl or thiocarbonyl group, or an imino group which is unsubstituted or substituted by (C₁-C₆)alkyl, CO(C₁-C₆)alkyl or R^{11a} ; or R^2 and R^3 , or R^4 and R^5 together with the respective attached carbon atom form a (C₃-C₈)cycloalkyl ring;
- R^7 is (C₁-C₈)alkyl, (C₃-C₆)alkenyl, (C₃-C₆)alkynyl, $-(CR^9R^{10})_pR^{11}$ or $-(CR^9R^{10})_p$ heterocyclyl;
- R^8 is (C₁-C₄)alkoxy or OH;
- 10 R^9 and R^{10} are each independently H, (C₁-C₄)alkyl or (C₁-C₄)haloalkyl;
- R^{11} is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₄)alkyl, (C₁-C₄)haloalkyl, (C₂-C₄)alkenyl, (C₂-C₄)alkynyl, (C₃-C₆)cycloalkyl, $-(CH_2)_uR^{11a}$, heterocyclyl, halogen, (C₁-C₄)alkoxy, (C₁-C₄)haloalkoxy, $S(O)_nR^{12}$, CN, CO₂(C₁-C₄)alkyl, NO₂, amino, (C₁-C₄)alkylamino and di-(C₁-C₄)alkylamino; (more preferably R^{11} is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₄)alkyl, halogen, (C₁-C₄)alkoxy, NO₂ and amino);
- 15 R^{11a} is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₄)alkyl, (C₁-C₄)haloalkyl, halogen, (C₁-C₄)alkoxy, (C₁-C₄)haloalkoxy, $S(O)_nR^{12}$, CN, CO₂(C₁-C₄)alkyl, CO₂H, NO₂, OH, amino, (C₁-C₄)alkylamino and di-(C₁-C₄)alkylamino;
- 20 R^{12} is (C₁-C₄)alkyl or (C₁-C₄)haloalkyl;
- X is O or S;
- m is 0;
- 25 p, r, s and u are each independently 0 or 1; and
- each heterocyclyl in the above mentioned radicals is independently a heterocyclic radical having 3 to 7 ring atoms and 1 to 4 hetero atoms selected from N, O and S.

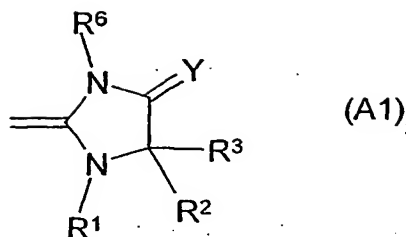
7. A compound or a salt thereof as claimed in any one of claims 1 to 6 wherein:

30 W is CF₃;

Z is CH;

=Q is a group of formula (A1):

127



R^1 and R^6 are each independently H, (C_1-C_8) alkyl, (C_3-C_6) alkenyl, $CO(C_1-C_6)$ alkyl or $SO_2(C_1-C_6)$ alkyl; or are $-(CR^9R^{10})_pR^{11}$;

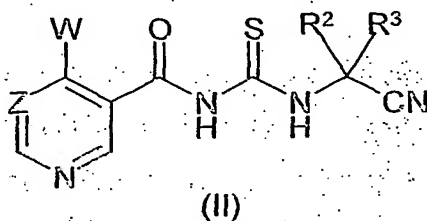
R^2 and R^3 are each independently H, (C_1-C_8) alkyl, (C_3-C_6) alkenyl, (C_3-C_6) alkynyl,
 5 $-(CR^9R^{10})_pR^{11}$, $-(CR^9R^{10})_p$ heterocyclyl or $O(CH_2)_rR^{11}$;

Y is O or S; and

heterocyclyl is a heterocyclic radical having 3 to 7 ring atoms and 1 to 4 hetero atoms selected from N, O and S.

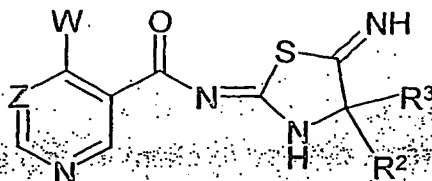
10 8. A process for the preparation of a compound of formula (I) or a salt thereof as defined in any one of claims 1 to 7, which process comprises:

a) where $=Q$ is a formula (A), R^2 and R^3 are as defined in claim 1 excluding where together with the attached carbon atom they form a carbonyl, thiocarbonyl or imino group, R^4 and R^5 together with the attached carbon atom form a thiocarbonyl
 15 group, R^1 and R^6 are each a hydrogen atom and m is zero, the cyclisation-rearrangement reaction of a compound of formula (II):



wherein W and Z are as defined in claim 1, R^2 and R^3 are as defined in claim 1 excluding where together with the attached carbon atom they form a carbonyl,

20 thiocarbonyl or imino group, by heating and/or reaction in the presence of a base, via an intermediate of formula (III):

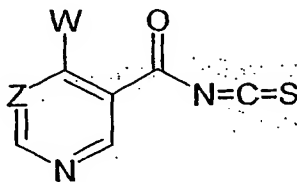


128

(III)

wherein W, Z, R² and R³ are as defined in claim 1, which rearranges to the compound of formula (I); or

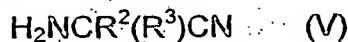
- 5 b) where W and Z are as defined in claim 1, =Q is a formula (A), R² and R³ are as defined in claim 1 excluding where they form a carbonyl, thiocarbonyl or imino group, R⁴ and R⁵ together with the attached carbon atom form a thiocarbonyl group, R¹ and R⁶ are each a hydrogen atom and m is zero, reacting a compound of formula (IV):



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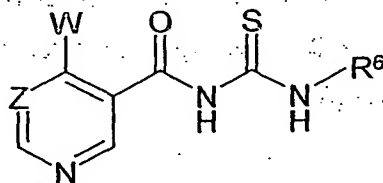
(IV)

wherein W and Z are as defined in claim 1, with a compound of formula (V):



- wherein R² and R³ are as defined in claim 1 excluding where together with the attached carbon atom they form a carbonyl, thiocarbonyl or imino group, to give the corresponding compound of formula (II); followed by cyclisation and rearrangement as described in process a) above; or

- 15 c) where =Q is a formula (A), R¹ is a hydrogen atom, R² and R³ are as defined in claim 1 excluding where together with the attached carbon atom they form a carbonyl, thiocarbonyl or imino group, R⁴ and R⁵ together with the attached carbon atom form a carbonyl group, W, Z and R⁶ are as defined in claim 1 and m is zero, reacting a compound of formula (VI):

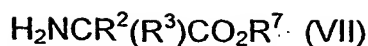


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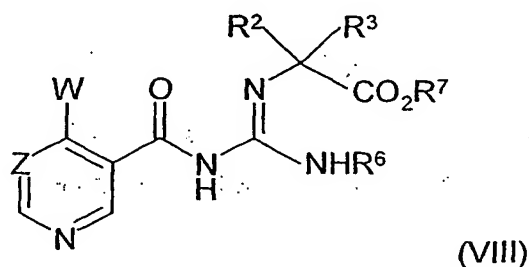
(VI)

wherein W, Z and R⁶ are as defined in claim 1, with a compound of formula (VII):

129

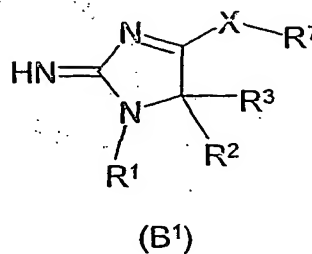
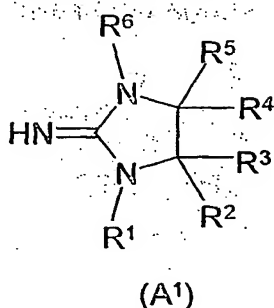


wherein R^2 and R^3 are as defined in claim 1 excluding where together with the attached carbon atom they form a carbonyl, thiocarbonyl or imino group, and R^7 is a leaving group, in the presence of a coupling agent to give an intermediate compound
 5 of formula (VIII):

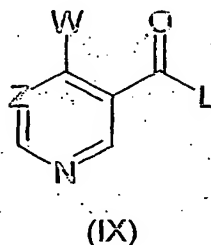


wherein the various symbols are as defined above, followed by cyclisation; or

d) where $=\text{Q}$ is a formula (A) or (B), m is zero and the other symbols are as defined in claim 1, acylating the corresponding compound of formula (A¹) or (B¹):
 10



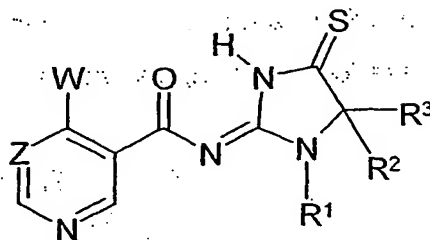
wherein the various symbols are as defined in claim 1, with a compound of formula (IX):



wherein W and Z are as defined in claim 1 and L is a leaving group; or

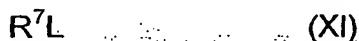
e) where $=\text{Q}$ is a formula (B), W , Z , R^1 and R^7 are as defined in claim 1, X is S , m is zero, and R^2 and R^3 are as defined in claim 1 excluding where together with the attached carbon atom they form a carbonyl or thiocarbonyl group, or an imino group
 5

which is unsubstituted or substituted by (C₁-C₆)alkyl, CO(C₁-C₆)alkyl or R^{11a}, reacting a compound of formula (I) which is of formula (X):



(X)

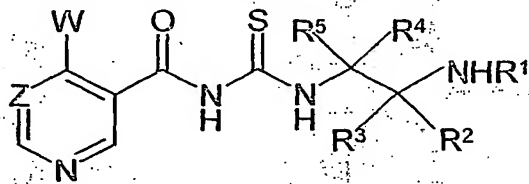
- 5 wherein W, Z, R¹, R² and R³ are as defined in claim 1, with a compound of formula (XI):



(XI)

wherein R⁷ is as defined in claim 1 and L is a leaving group; or

- 10 f) where =Q is a formula (A), W, Z, R¹, R², R³, R⁴ and R⁵ are as defined in claim 1, R⁶ is hydrogen and m is zero, cyclising a compound of formula (XII):



(XII)

- 15 wherein W, Z, R¹, R², R³, R⁴ and R⁵ are as defined in claim 1, in the presence of a base; or

- g) where =Q is a formula (A), W, Z, R¹, R² and R³ are as defined in claim 1, R⁴ and R⁵ together with the attached carbon atom form a carbonyl group, R⁶ is hydrogen, and m is zero; oxidising and hydrolysing a compound of formula (I)
- 20 wherein Q is a group of formula (B), X is S, and W, Z, R¹, R², R³ and R⁷ are as defined in claim 1, and m is zero; or

- h) where =Q is a formula (B), W, Z, R², R³ and R⁷ are as defined in claim 1, R¹ is CO(C₁-C₆)alkyl which is unsubstituted or substituted by one or more R⁸ groups, or is

COR^{11a} or CO-heterocyclyl, and m is zero, acylating the corresponding compound of formula (I) wherein R¹ is hydrogen, using a compound of formula (XIII):



wherein L is a leaving group; or

5

i) where Q is a group of formula (A), W, Z, R², R³, R⁴, R⁵ and R⁶ are as defined in claim 1, R¹ is CO(C₁-C₆)alkyl which is unsubstituted or substituted by one or more R⁸ groups, or is COR^{11a} or CO-heterocyclyl, and m is zero, acylating the corresponding compound of formula (I) wherein R¹ is hydrogen, using a compound of formula (XIII) as defined above; or

10

j) where Q is as defined in claim 1, and m is 1, oxidising a corresponding compound in which m is 0; and

15 if desired, converting a resulting compound of formula (I) into a pesticidally acceptable salt thereof.

9. A pesticidal composition comprising a compound of formula (I) or a pesticidally acceptable salt thereof as defined in any one of claims 1 to 7, in association with a pesticidally acceptable diluent or carrier and/or surface active agent.

20

10. The pesticidal use of compounds of the formula (I) or their salts as claimed in any of claims 1 to 7, or of a pesticidal composition as claimed in claim 9.

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